The Agricultural College

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WEEDS

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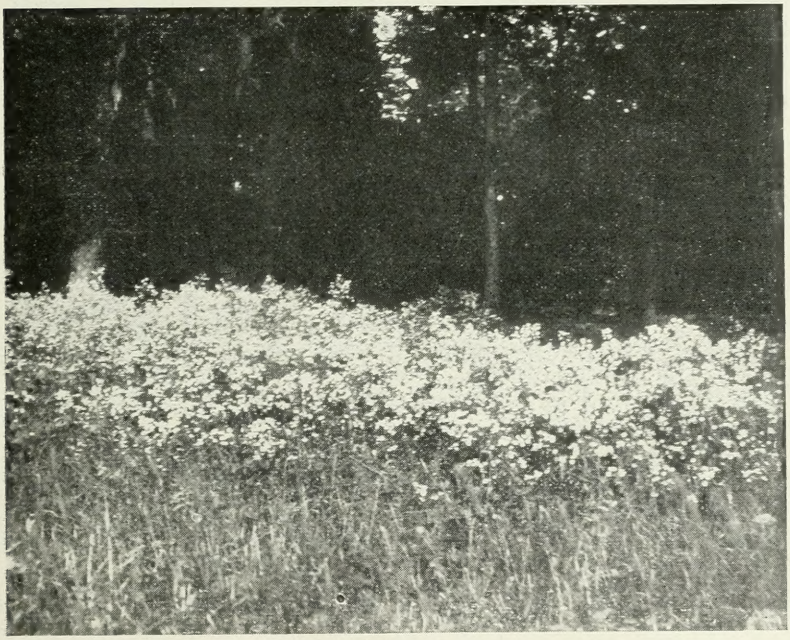

"Now what hath entered my loved woods,
And touched their green with sudden change?
What is this last of Nature's moods
That makes the roadside look so strange?
Who blanched my thistle's blushing face,
And gave the winds her silver hair?
Set goldenrod within her place,
And scattered asters everywhere?"

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NOVEMBER.

No sun—no moon!
No morn—no noon!
No dawn—no dusk—no proper time of day—
No sky—no earthly view—
No distance looking blue—
No road—no street—no ''t'other side the way''
No end to any ''Row''—
No indication where the Crescents go—
No top to any steeple—
No recognitions of familiar people—
No courtesies for showing 'em—
No knowing 'em!
No traveling at all—no locomotion,
No inkling of the way—no notion—
''No go''—by land or ocean—
No mail—no post—
No news from any foreign coast—
No park—no ring—no afternoon gentility—
No company—no nobility—
No warmth, no cheerfulness, no healthful ease,
No comfortable feel in any member—
No shade, no shine, no butterflies, no bees,
No fruits, no flowers, no leaves, no birds,
November!

—Thomas Hood.

WEEDS

By Vernon H. Davis.

> The Father of humankind himself ordains
> The husbandman should tread no path of flowers,
> But waken the sleeping earth with sleepless pain.
> —Vergil.

The farmer is interested in growing plants, but only those for which he can find some use. The others he calls weeds and seeks to destroy them. A weed, then, may be said to be only a plant out of place—that is, out of place from the standpoint of man, because it persists in growing where he wants something else. There is no such thing in nature as a weed. Just as soon as use is found for a so-called weed it ceases to be a weed and is classed among the cultivated plants, to be spared and protected from its former companions. Then, there are certain conditions where a cultivated plant becomes a weed. Rye in the wheat field is often the worst of weeds. The common purslain of our gardens was once generally cultivated as a pot herb.

Weeds injure the farmer chiefly in two ways. First, by offending his idea of the beautiful. This injury is an important factor in the value of the land, and, furthermore, it is one that is felt by the whole community. A farm overrun with weeds is not only less valuable itself, but it makes every other farm in the community less valuable. Second, by the crop loss. This is the loss that receives the more common estimate. The farmer's profits are lessened in a number of ways, the most important of which are the following:

(1) Weeds rob the soil of moisture. The amount of water that must be taken up by the roots of any plant and exhaled into the air through the leaves is enormous. Experiments have shown that for most of the cultivated grasses from three to five hundred pounds of water must actually pass through the plants to produce a single pound of dry matter. It is easy to understand that in seasons of drouth, when there is scarcely enough moisture to supply the cultivated crops, great injury is done by the presence of a large number of additional weedy plants. This is doubtless the most important of the weed injuries, for it must not be forgotten that the moisture in the soil is all important. Ask the average farmer why he cultivates his corn, and he will say, "To kill the weeds," when, as a matter of fact, his purpose is, or should be, that of conserving the moisture in the soil. The weeds

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Since the law requires that Agriculture be taught in the common schools during the coming year, it has been thought best to republish some of the Extension Bulletins which will be most helpful in conducting the work.
A. B. GRAHAM,
Superintendent of Agricultural Extension.

are killed incidentally. A clean cornfield, as well as a weedy one, needs cultivation.

(2) Weeds crowd the cultivated plants, depriving them of light and space in both soil and air. If corn or wheat are planted too thickly they cannot develop properly, because the plants do not get enough sunlight and the roots do not have sufficient feeding space. The results will be similar if the extra plants are weeds.

(3) Weeds rob the soil of food elements required by other plants. While there is usually more than enough food for all plants in every soil, the amount in a readily available form is limited, and the greater the number of plants among which it is divided the slower and less vigorous the growth of all.

(4) Weeds harbor injurious insects and diseases. Overgrown fence rows and ditches furnish ideal wintering places for many of these troublesome enemies.

(5) Weeds sometimes kill farm stock or render their products unsalable. Mountain laurel, wild parsnip, and a few other weeds sometimes kill stock. Wild onion, very abundant in some places, often renders milk and its products unsalable.

(6) Weeds reduce the value of other products of the farm, such as hay. The presence of weed seed in commercial, farm, and garden seed not only reduces its value, but opens the way for the introduction of a weed pest into a new locality, from which it can, perhaps, never be eradicated.

Other injuries will suggest themselves, but those named are perhaps the most important.

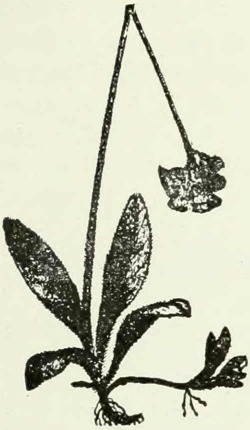
Annuals and biennials are reproduced almost entirely from seed. Plants of these classes especially spring up in the most unexpected places. It has been found that the seeds of many of these weeds will retain their vitality for fifteen or twenty-five years, possibly longer, and not all of a given year's seed grow in any one year. This great vitality will explain, in part at least, why it is so hard to completely eradicate any weed from a given piece of land, even though all re-seeding may be prevented. After two or three seasons of comparative freedom from white top, the meadows are again white with it. Chess grows in wheat, and shepherd's purse and purslain among garden vegetables about as often as these particular crops are repeated.

HOW WEEDS SPREAD.

A careful study of the plant and its environment will usually give some clue as to how a weed has gained a foothold in a given locality and how it continues to spread from place to place. Weeds spread in two general ways—the **natural,** in which the plant is unaided by any human agencies, and the **artificial,** in which man aids in their distribution. The natural method is subdivided into two classes—those belonging entirely to the plant itself and those in which the plant or some part of it is modified in such a way as to take advantage of some natural agent—the wind, water, or animals.

NATURAL METHODS.

(a) Belonging to the Plant Itself.



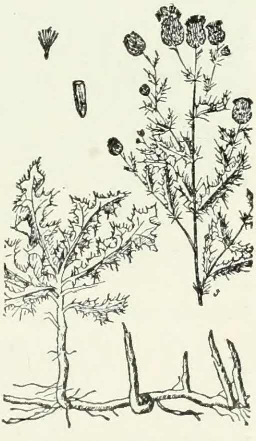
Orange Hawk Weed
This plant spreads by means of runners. Note the young roots on the runner.

One of the methods belonging solely to the plant is spreading by means of **runners** or slender, radiating branches which produce new plants at every node or joint of the stem. The common strawberry, cinquefoil, and orange hawk weed are plants that generally spread in this manner.

A similar method is employed by plants having weak, slender stems that grow upright and lop over until the tips come in contact with the soil. Here they take root and form new plants. The wild raspberry and dewberry spread in this manner.

Many troublesome weeds spread almost entirely by means of underground stems. These run along under the ground, producing buds that develop into new plants at every joint. The oxeye daisy, which becomes such a pest, spreads in this manner.

Still other plants spread by running roots, very similar to root stocks except that they have no definite joints or buds. Shoots are likely to spring up from any point along their course. Canada thistle, horse nettle and pea vine spread in this way.



Canada Thistle
Notice the new plants coming from the running root.

These natural methods favor the formation of dense patches or colonies of plants, which usually occupy the soil almost to the exclusion of all other plants.

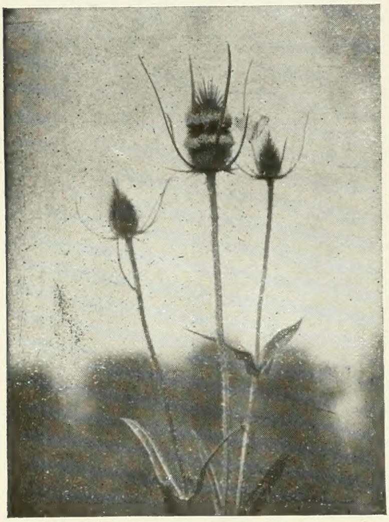
One of the most interesting yet least known methods by which

Several pictures found in this article are taken from the Ohio Weed Manual which can be obtained free from the Agricultural Experiment Station, Wooster, O.

plants travel short distances is by throwing the seeds. In the fruit or seed cases of some plants there is a tension set up in various ways as the parts ripen, which is suddenly released, throwing the seeds several feet away from the parent plant. The pods of the touch-me-not, the common tare or wild bean, the sorrel and some of the spurges develop this tension.

(b) Aiding the Plant by Outside Natural Agencies.

Let us now consider some of the methods by which weeds spread by the aid of external natural agencies, as wind, water, and animals.

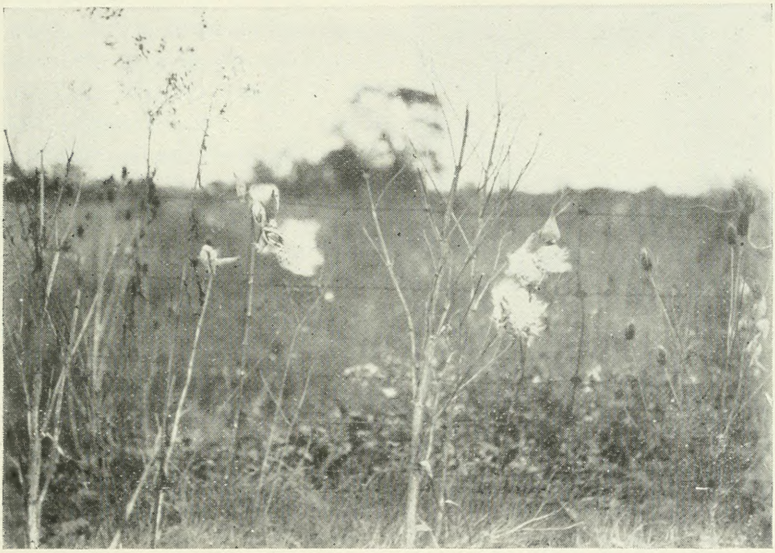


This Weed, Teasel, is, by mistake, often called Canada Thistle.

Wild Asters.

The common thistle, dandelion, wild lettuce and many other plants of the **compositae** family have seeds to which a part of the flower (calyx) adheres in the form of a downy parachute (pappus). The seeds of the common milkweed are provided with a tuft of hairs which is a direct outgrowth from the seed coat. In the fall the air is full of these little fluffy bodies. If we examine them carefully we will find that the seeds have dropped from all of those sailing along so easily in the gentle breeze. In this way seeds may be carried many miles in a heavy wind or storm. The seeds of the trumpet creeper and the broad and narrow leaved docks are winged and may be carried long distances by the wind.

On plains or level stretches, where the winds are strong, a curious habit of seed dispersal has been developed by certain plants known as tumble weeds. They are most numerous and best developed in the prairie regions, where the true tumble weed is the principal one. Others, less striking, are found in nearly every locality. A typical tumble weed should have a circular, compact top, ten or more inches in diameter, thickly branched in order to catch the wind, light, yet strong enough to hold together, and supplied with abundant seeds clinging to the plant with considerable tenacity so that only a few may be dropped at any one time. It must also be provided with some means permitting it to become easily detached from the ground. Probably the most common tumble weed in this state is the old-witch grass. In the fall of the year its panicles can be seen along the fences and in the ditches.

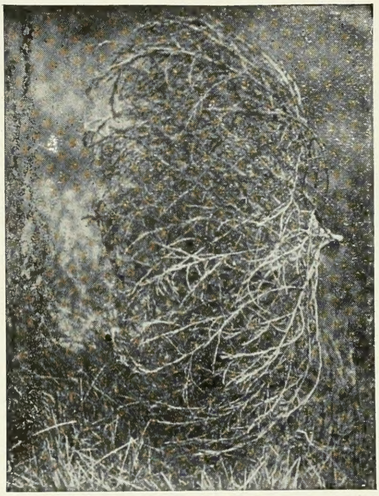


Milk-weed
In a heavy wind or storm seeds may be carried many miles by these tufts of hairs.

When the ground is covered with snow and ice, strong winds often blow the large angular seeds of the great and common ragweed over the smooth surface for long distances.

Next to the wind, water is the most important natural agent in the distribution of seeds. Every dashing rain carries innumerable seeds into the muddy hillside rivulets it creates. Every flood brings down large quantities of weed seeds that find lodgment over the lowlands, and makes doubly difficult the task of keeping such lands free from weeds. Darwin, in his "Origin of Species," describes a simple experiment illustrating this point very well. He says: "I took, in February, three tablespoonfuls of mud from three different points beneath the water's surface on the edge of a little pond. This mud, dried, weighed only six and three-fourths ounces. I kept it covered in my study for six months, pulling up and counting each plant as it grew. The plants were of many kinds, and were, altogether, 537 in number."

Animals furnish another natural means of weed migration. Many weedy plants, as the wild raspberry, blackberry, pokeweed, moonseed, etc., have fruits that are eaten by birds, and the hard seeds often pass through the alimentary canal undigested. If conditions are favorable, the seeds germinate and grow where they are dropped. In the same way domestic animals distribute weed seeds from field to field and from farm to farm. Perhaps the most important way in which animals, either wild or domesticated, aid in the distribution of weeds is by carrying the seeds on their coats. Everyone is familiar with the way in which the burrs of the burdock, sand or cockle burrs, spanish needles, beggar's lice, etc., stick to the hair of animals and the clothing of persons. Perhaps we little think, as we pick these objects from our clothing, the fur of our favorite dog, or the tails of our horses and cows, just how we have served these plants.



Tumble Weed
This plant is one of the common pig weeds found in this State.

These various methods of weed dispersal are effective over limited areas, but are insufficient to explain the rapid migration of weeds, many examples of which we have seen in recent years. Those plants that have become weeds have probably been more widely spread by the various artificial agencies than by all the natural agencies combined.

ARTIFICIAL METHODS.

A brief summary of some of the most important artificial methods may suggest ways by which the distribution can be checked.

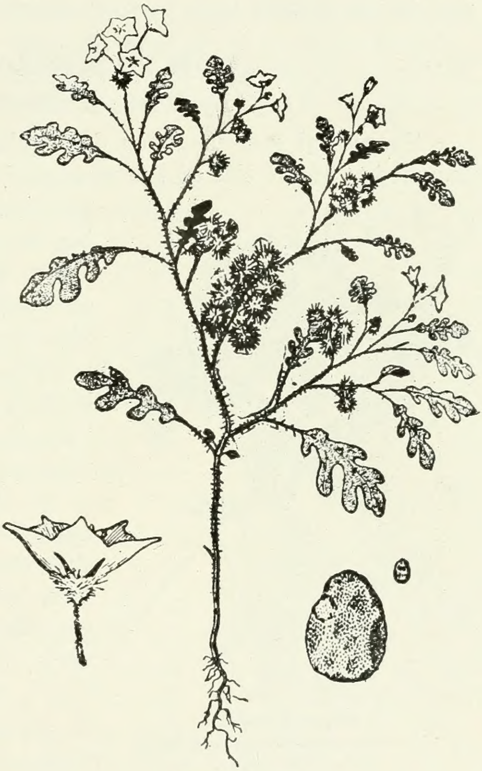
1. Roots and seeds carried in farm machinery. The roots and underground stems of the Canada thistle, horse nettle, pea vine and all weeds that spread from these parts are scattered almost exclusively by the cultivating tools. The bulbs of wild garlic spread very slowly unless scattered by the plow and the harrow. While weeds of this kind are not very likely to be carried off the farm by the cultivating tools, the seeds are likely to be carried by self-binders and threshing

machines that are taken from farm to farm without being cleaned.

2. Seeds and bulbs carried in plants and nursery stock. The possibilities of introducing weed pests in this way are very great. The nut grass of the West and Southwest came to New Orleans from the West Indies with garden plants and was introduced into Arkansas from New Orleans with strawberry plants.

3. Weed seeds are often carried in packings of various kinds. In the packing of crockery, glassware, castings, etc., cheap hay or straw is commonly used, and the presence of weed seeds in it may be taken as a matter of course. This material usually gains a wide distribution and is finally thrown out into some vacant lot or reaches the fields through stable manures. The common woolly mullein probably came from France in crockery packing.

4. Weeds carried in hay. This means is a most effective one for the dissemination of weeds. Tradition has it that the Canada thistle was first introduced into the United States in northern New York in hay brought over for General Burgoyne's horses during the Revolutionary war. It is always best to avoid hay from regions known to be infested with bad weeds.


Buffalo Burr
A recent introduction. First seen along the railroads. Brought here on cars from the West. May be known by sharp prickles on the under side of leaves.

5. Weed seeds carried in commercial seeds. This means is by far the most important agent for the distribution of weeds. It is safe to say that more weeds have come to us through impure field and garden seeds than from all other sources. In order to be extensively distributed with a commercial seed, the weed seed must be approximately of the same size, shape, weight, and color as the former; otherwise it will be easily separated from the other by the modern methods of cleaning or will be readily detected.

6. Weeds introduced as useful or ornamental plants. A number of our most troublesome weeds fall into this category. The seed of the oxeye daisy was brought to Rhode Island in 1715 and sown for horse feed. Wild garlic escaped from the gardens of the early Germantown settlers, who used it for flavoring. Purslain was cultivated for greens in Massachusetts, and was later taken to Michigan, where it was grown for the same purpose. Wild carrot, morning glory, and poppy have escaped to the wild from the old vegetable and flower gardens and in many cases have become serious pests.

HOW TO DESTROY WEEDS.

(a) By Direct and Systematic Methods.

Successful measures for destroying weeds are founded upon a knowledge of the life of the weed and the manner of its propagation. To avoid the introduction or spreading of weeds is always better than to allow them to come in and have to destroy them. It is to be remembered also that while some weeds may be completely eradicated, others can only be held in check. While methods must vary in different weeds, a few general principles are applicable to all.

Horse Nettle
A bad pest whose seeds are often sown with clover.

1. The seeding of all weedy plants and the introduction of weed seeds should be prevented as far as possible. This will be sufficient to subdue the annuals and biennials. The numerous ways, both natural and artificial, by which seeds may be introduced makes it impossible to carry out fully the above rule; but much that will prove helpful can be done.

2. Perennial weeds of all kinds must be cut repeatedly to starve out the underground roots or stems. If the foliage of a plant is constantly destroyed, the death of the plant is only a matter of time and will be caused directly by root starvation. Any breaking or cultivating of the soil in which these plants grow only serves to scatter them, unless that cultivation is persistent enough to keep down **all** growth of foliage. Salt, coal oil, and sulfuric acid may also be applied, but these are expensive. Persistent cutting will usually be found to be the cheapest and most effective method.

3. Some weeds are indicators of soil conditions. To eradicate them, these conditions must be changed. Sorrel grows on acid soils. When this weed makes its appearance, treat the soil with lime. The soil will not only be improved, but the weed will disappear. No amount of cutting or cultivating will eradicate it so thoroughly. A particular kind or class of weeds, such as swamp grass, sedges, cat tails, etc., always grow on wet soils. No amount of cutting will eradicate them, but a tile drain will do so thoroughly and quickly.

4. Persistence by simple methods will be more effective than spasmodic efforts and will often times be more effective than expensive processes. While these direct methods may often be effective, the most successful will be those which tend to put the soil in the best condition for crop production.

Nature covers the bare rocks with low forms of plant life that can exist under unfavorable conditions. Here they live and aid in the breaking down processes. They die and their bodies are added to the crumbled or disintegrated rock. After awhile enough soil is formed for higher forms of plant life. Finally a soil is created in which a splendid forest can grow. Nature grows the plants that are best suited to certain conditions. It is not particular whether that be a mullein or an oak. Man is interested in growing only plants which are of value to him. These plants, taken from their natural surroundings, have been so changed by long years of cultivation and selection that now they cannot live in their former wild or natural state. In a sense, they are artificial and require artificial conditions for their growth and development. In order to give some part of the cultivated plants a chance to develop abnormally, they must often be planted so far apart that they can never completely occupy the soil. Other plants creep in to fill up the vacancies. Weeds grow where they can find room. Some crops, then, permit certain weeds to grow with them, while other crops furnish congenial conditions for another weed. Cockle and cheat have, perhaps, grown with wheat as long as wheat has been cultivated. Purslain and pigweeds are found in gardens; thistles and mulleins in pastures; white top in meadows.

Sorrel

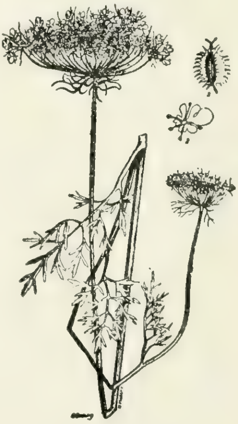
This plant grows on acid or sour soil. Its leaves give patches of it a reddish color.

(b) By the Rotation of Crops.

The fact that certain weeds are serious pests when found with certain cultivated crops and are not serious pests with others suggests the most important of all ways of combatting weeds, viz., the rotation of farm crops. If the thistles and mulleins overrun the pasture, plow it up and grow corn. If the pea vine, crab grass, foxtail, ragweed, etc., become serious in the cornfield, sow it down to grass. One crop in the rotation will destroy those weeds gaining a foothold with the preceding crop. No weed can stand thorough cropping of the land and judicious, systematic rotation of crops. Inasmuch as cropping and rotation are vital to successful agriculture, weeds are never serious where the land is well farmed. The reverse of this proposition means that serious prevalence of weeds is an infallible indication of bad farming. Perhaps some of my readers will question this statement, but let them recall the weedy areas they have known. Meadows overrun with white top and daisies are those that have been mown or improperly made. The farmer says that these weeds have run out the grass; the fact is, the grass has disappeared and the daisies and white top have quickly come in to take its place. Wild carrot is common in old and worn out pastures. The rank patches of Canada thistle and other noxious weeds are usually found in neglected fields or roadsides.

White Top in Timothy
A common meadow pest.

About twenty-five or thirty years ago the Russian thistle, a hardy member of the pigweed family, was introduced in flaxseed into the Northwest. The farmers in that section were growing wheat year after year. This system of farming was not only rapidly ruining the land, but was leaving the soil in the possession of this hardy intruder during the summer and fall long enough to mature and ripen its seeds. In an incredibly short time it became such a serious pest that the people became alarmed and petitioned Congress for a half million dollars with



Wild Carrot

which to fight it. To-day little is heard about this pest. It is a serious weed in twenty-one or twenty-two states, but a rational system of crop rotation, instead of the one-sided system of farming practiced when it first made its appearance, has proven a natural check. Fields of it are now sown for sheep grazing. A rotation of wheat, corn, clover, and grasses, in connection with live stock of all kinds, has taken the place of wheat alone. The Russian thistle was a blessing to this region because it forced a better system of agriculture as a means of protection. A few years ago some alarmist prophesied that the Canadian thistle would overrun the whole northern part of the United States and practically destroy the agriculture of this great region, but climatic limitations and good farming have quietly checked its spread.

SUMMARY.

Weeds have to do with the conditions of agriculture existing in any given region. While no farmer, however good, can hope ever to rid his farm of weeds, he can keep them in check easily and cheaply by the following methods of tillage that increase the productiveness of the soil:

1. Practice a system of rotation as indicated above.
2. Grow hoed crops—corn, potatoes, cotton, etc., upon the land infested.
3. Grow clover and alfalfa whenever practical. These crops occupy the soil well and may be cut several times a year. Seeding is thus prevented to a great extent.
4. Grow soiling* crops, both because they may be cut at almost any time and because they shade the ground.
5. Keep the land growing some crop. Avoid fallows. (Fallow land is that left uncultivated and without a growing crop.) When one crop is harvested, start another immediately. If you don't start one, Nature will.
6. Stimulate the soil to a maximum production by thorough cultivation and liberal use of fertilizers. If the cultivated plants make a vigorous growth, there will be less room and fewer chances for the weeds.

Weeds in many cases have been blessings in disguise. They have taught us to till the soil properly and to cultivate the plant thoroughly.

"Solomon went by the field of the slothful and by the vineyard of the man void of understanding, and, lo! it was all grown over with thorns, and nettles had covered the face thereof."

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* Soiling crop is one grown to be cut and fed while green.

EXPERIMENTS TO SHOW CONDITIONS NECESSARY FOR PLANTS TO GROW WELL.

1. In two small tin cans or tumblers, plant beans, peas, or corn. After the plants have appeared above the ground, place one vessel in the sunlight and the other in the cellar or under a box. Each must be given the same quantity of water. What difference do you notice in the plants?

2. In two small boxes or old tin cans, plant corn, beans, or peas. Bore or punch holes in the bottom of one for drainage. Let the other be without drainage. Place both in the sunlight. After the sprouts are above ground, pour water on the one provided for drainage until it can be seen running from the holes. Pour the same quantity on the other. After a week, what differences do you observe?

3. Plant a few grains of corn in a box of very clean sand. In another can or box of loam plant at the same depth a like number of grains. Provide drainage. Give same quantity of water to each. As the plants develop, what difference is noticed? Why is there a difference? In which soil was there the most plant food?

4. In two cans of loam or sandy clay, plant a few grains of corn. Punch holes for drainage. Moisten the soil in one can with rain or warm water. Moisten that in the other with water to which eight or ten drops of ammonia or hartshorn have been added. (Have you ever noticed the odor of ammonia about the stables or barnyard?) Which plants grow more rapidly and with a dark green color?

5. Plant corn in small baking-powder cans provided with drainage. After the corn is up about two inches, set one can on a piece of writing paper or on any other strong paper. Place a glass fruit jar over the can and seal to the paper by using beeswax and a match. If the free air supply is completely cut off, which corn grows the more rapidly?

Which experiment teaches us that sunlight is necessary for vigorous growth? Which that plant food is required? Ammonia or hartshorn contains nitrogen. Does the ammonia serve as a plant food? How are plants on the farm supplied with food? If a plant needs water, why is drainage necessary? Which is the warmer, drained or undrained soil? Is free air necessary? Why? From what does the dampness on the inside of the glass jar come?

ARITHMETIC.

1. If 7 pecks of wheat are sowed to the acre, how much wheat is required to seed a field 30 rods long and 20 rods wide?

2. A furrow slice is 9 inches wide and 80 rods long. What part of an acre is plowed in turning one furrow of this length?

3. A wagon and load of ear-corn weigh 4274 lbs. The wagon weighs 1250 lbs. What is the corn worth at 40 cents per bushel?

4. Posts for wire fence are set one rod apart. How many will be needed for one-half mile of fence, counting two end posts?

5. Broom corn is worth $180.00 per ton. What are 500 pounds worth?

6. If 1½ cents per quart is paid for picking strawberries, what is paid for picking one bushel?

7. In a test of oats for vitality, it was found that 36 of 120 grains failed to sprout. What per cent failed to grow?

8. Which will carry more water, one 6-in. or two 4-in. tiles?

9. Where is the height of a horse measured? A horse is said to be 15 hands high. How many feet high is the horse?

10. A horse trots a mile in three minutes. How many feet does it go in one second?

11. In a shock of corn 12x12 hills there were 400 stalks of corn. Twenty stalks had no ears on them. What per cent of the stalks yielded corn?

12. If there is a loss of 15 per cent from barren stalks and the yield is 51 bushels per acre, what would have been the yield per acre had every stalk produced an ear?

13. Corn is worth 42 cents a bushel. What is the loss in the last problem?

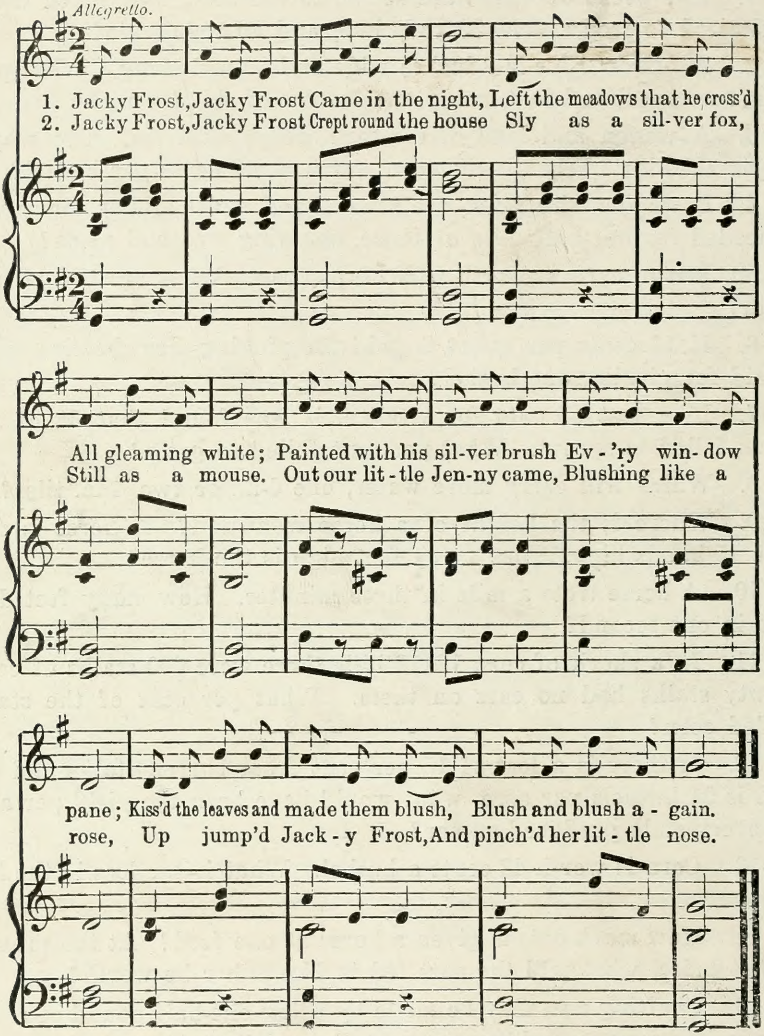
14. How much oats is given a horse at one feed? At the present market price, what will the oats fed in November be worth?

15. Grafting wax may be made by using one-half pound of rosin, 5 ounces of beeswax, and 3 ounces of tallow. What per cent of the mixture is each ingredient? How much of each would be required for 3½ pounds of wax?

16. A cow yields, during October, 625 pounds of milk. The milk tests 3.8 per cent butter fat. How many pounds of butter fat were produced?

Jacky Frost.

Laura E. Richards. Eleanor Smith.


Allegretto.
1. Jacky Frost, Jacky Frost Came in the night, Left the meadows that he cross'd All gleaming white; Painted with his sil-ver brush Ev-'ry win-dow pane; Kiss'd the leaves and made them blush, Blush and blush a-gain.
2. Jacky Frost, Jacky Frost Crept round the house Sly as a sil-ver fox, Still as a mouse. Out our lit-tle Jen-ny came, Blushing like a rose, Up jump'd Jack-y Frost, And pinch'd her lit-tle nose.

From "In My Nursery." Copyright, 1890, by Roberts Brothers.

The College of Agriculture will help teachers and others to name plants, insects, fruits, etc., from specimens mailed or expressed. Our desire is to see Nature Work and Agriculture successfully pursued. Occasionally an instructor may be secured for some special instruction in Dairying, Horticulture, Soil Fertility, Animal Judging, or Farm Crops.

A. B. GRAHAM, Supt. Agricultural Extension.